

**PARTICULATE MATTER
MONITORING NETWORK DESCRIPTION
FOR THE
NORTH CENTRAL COAST AIR BASIN
MONITORING PLANNING AREA**

PREPARED BY

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1.0 INTRODUCTION

This plan provides a description of the PM_{2.5} ambient monitoring network designed for the North Central Coast Monitoring Planning Area. The deployment of this network is a critical component in the national implementation of the new PM_{2.5} National Ambient Air Quality Standards (NAAQS). The ambient data from this network will be used for designating areas as attainment or nonattainment, developing cost-effective control programs, and to tracking the progress of such programs.

During the early process of the PM_{2.5} network design the Air Resources Board (ARB) and the local air quality districts established Monitoring Planning Areas (MPAs) for the State. The entire State is covered by 18 MPAs. These MPAs will be used for planning monitoring locations for PM_{2.5}. They are not intended for designating areas as attainment or nonattainment or planning control measures. The U.S. EPA has not yet established the boundaries to be used for these purposes.

The proposed PM_{2.5} monitoring network for the North Central Coast MPA includes two monitoring sites. In most cases, the PM_{2.5} sites are located at the existing PM₁₀ sites. The locations of the proposed sites are presented on the map (Figure ____). All sites will operate a Federal Reference Monitor (FRM) and one of these sites will also include a collocated sampler for QA/QC requirements and a speciation monitor to further define the chemical composition of the PM_{2.5}. In addition to the two sites operated by the District EPA is proposing two additional sites one in each Class I Area within the North Central Coast MPA as follows Pinnacles NM, and Ventana Wilderness.

Monterey Bay Unified Air Pollution Control District - 2 sites;
Pinnacles NM - 1 site; and
Ventana Wilderness Area - 1 site.

1.1. Physical Setting

The **North Central Coast MPA** is the same as the North Central Coast Air Basin. The MPA contains 3 counties -- all of Monterey, Santa Cruz, and San Benito counties.

1.2 Population Characteristics

The population of a Metropolitan Statistical Area (MSA) is one of the key parameters in determining the minimum number of required monitoring sites per the U.S. EPA PM_{2.5} regulations.

The MSAs included in the North Central Coast MPA are listed along with population figures in Table 1.5.1. The cities and counties included in the MPA are listed along with population figures in Table 1.2.1.

**Table 1.2.1 Population in the North Central Coast Monitoring Planning Area
by City and County**

Monterey County	Population (based on 1995 figures)
Carmel	4,350

Del Rey Oaks	1,553
Gonzales	6,000
Greenfield	9,301
King City	9,450
Marina	16,595
Monterey	31,378
Pacific Grove	15,987
Salinas	124,702
Sand City	227
Seaside	26,942
Soledad	18,290
Unincorporated	96,673
Total County Population	361,448
Santa Cruz County	Population (based on 1995 figures)
Capitola	10,187
Santa Cruz	54,004
Scotts Valley	10,031
Watsonville	34,170
Unincorporated	135,386
Total County Population	243,778
San Benito County	Population (based on 1995 figures)
Hollister	23,927
San Juan Bautista	1,914
Unincorporated	18,592
Total County Population	44,433
Total Population North Central Coast MPA 649,659	

1.3 Climate and Weather

The North Central Coast MPA is in the Monterey Bay Area and has a mild climate due to its proximity to the ocean. Winter temperatures average 45-50°F and summer temperatures average in the low 70's. Greater temperature extremes occur in the inland portions of the air basin.

Temperature inversions are characteristic of the area's coastal marine climate. During the late summer and fall, the relatively cool air can become trapped under a warm air layer preventing the dispersion of air pollutants.

The prevailing sea breeze in the Monterey Bay area is created by heating of the interior portions of the State by the sun, which forms an updraft and tends to draw the relatively cooler air over the ocean inland. This tends to make the prevailing wind direction from the west. At night as the land cools in comparison to the temperature of the ocean, the action is reversed. Topographic troughs between the principal mountain ranges act as “funnels” through which the prevailing winds are directed.

1.4 Dominant Economic Activities and Emission Sources

In the North Central Coast MPA, the dominant land use in the region is agriculture with approximately 1,626,000 agricultural acres or 338,500 farmed acres (pasture land excluded). About 82 percent of farmed agricultural land is in the Salinas Valley with 12 percent in San Benito and 6 percent in Santa Cruz County. The gross agricultural crop value for 1996 was \$1.9 billion in Monterey County \$160 million in San Benito County and \$240 Million in Santa Cruz County for a total of over \$2.3 billion.

Institutional land uses occupy significant portions of the land area within the region. Military land uses in Monterey County include Fort Hunter-Liggett, Camp Roberts, and the Naval Postgraduate School, and the Presidio of Monterey. Other major institutional uses are the University of California at Santa Cruz (UCSC) and the Soledad Correctional Facility. Fort Ord, comprising almost 28,000 acres, was closed in 1993. The state University at Monterey Bay and UCSC have received over 2000 acres of Fort Ord land for education and research uses.

The region has a significant amount of land in open space and recreation uses including several large State Parks The Ventana Wilderness (164,503 acres), the Los Padres National Forest (304,035 acres), and the Pinnacles National Monument. Over 17,000 acres of Fort Ord have been dedicated to open space and recreational uses. The California Department of Parks and Recreation operates over 25 visitor facilities in the region.

Industrial activity includes oil production (San Ardo oil field), power generation (Moss Landing), commercial fishing (Moss Landing), cement manufacturing (Davenport), quarrying activities (all three counties), agricultural processing in the Salinas and Watsonville areas, sand mining (Hollister, Marina, Scotts Valley, and the North Coast of Santa Cruz County), asbestos mining and milling (San Benito County and Monterey County, respectively) food processors (Salinas, Watsonville and Santa Cruz) and electronic manufacturing firms (Scotts Valley, Santa Cruz, Watsonville and Salinas.

From the ARB 1995 updated emission inventory, the total estimated PM-2.5 emissions for North Central Coast Air Basin are 25 tons per day (tpd). The sources responsible for the PM2.5 emissions in the North Central Coast MPA are listed in Table 1.4.1.

Table 1.4.1 PM2.5 Emission Inventory for the North Central Coast Air Basin

Category	Sources	Source Contribution (tons per day)
Stationary Sources	Fuel Combustion	
	Electric Utilities	.28

	Cogeneration	.03
	Oil and Gas Production	.03
	Manufacturing and Industrial	.30
	Food and Agricultural Process	.01
	Service and Commercial	.11
	Subtotal	.76
	Industrial Processes	
	Food and Agricultural	.07
	Mineral Processes	.86
	Other (Industrial Processes)	.02
	Subtotal	.95
	Total Stationary Sources	1.71
Area-Wide Sources	Miscellaneous Processes	
	Residential Fuel Combustion	3.64
	Farming Operations	1.99
	Construction and Demolition	2.21
	Paved Road Dust	1.39
	Unpaved Road Dust	3.85
	Fugitive Windblown Dust	2.39
	Fires	.03
	Waste Burning and Disposal	2.05
	Utility Equipment	.03
	Other(Misc. Processes)	.18
	Total Area-Wide Sources	17.77
Mobile Sources	On-Road Motor Vehicles	
	Light Duty Passenger	.19
	Light Duty Trucks	.09
	Medium Duty Trucks	.01
	Light Heavy Duty Gas Trucks	.05
	Med. Heavy Duty Gas Trucks	.01
	Light Heavy Duty Diesel Trucks	.08
	Med. Heavy Duty Diesel Trucks	.17
	Heavy Heavy Duty Diesel Trucks	.55
	Heavy Duty Urban Diesel Buses	.01
	Subtotal On-Road Motor Vehicles	1.18
	Other Mobile Sources	
	Aircraft	.05
	Trains	.05
	Ships and Commercial Boats	.02
	Recreational Boats	.10

	Comm. / Ind. Mobile Equipment	.23
	Farm Equipment	.40
	Subtotal Other Mobile Sources	.86
	Total Mobile Sources	2.03
Natural Sources	Natural Sources	
	Wildfires	3.35
	Total Natural Sources	3.35
Total North Central Coast Air Basin		24.86

1.5 PM2.5 Monitoring Requirements

Based upon the U.S. EPA PM2.5 regulation, all Metropolitan Statistical Areas (MSAs) with population greater than 200,000 are required to have core PM2.5 SLAMS (This is a site in a populated area representing PM2.5 concentrations on a neighborhood or urban scale). The required number of core SLAMS and sampling frequency is determined by the 1990 census population statistics for each MSA. In general, the greater the population in an MSA, the more monitoring sites required for that area.

In the North Central Coast Monitoring Planning Area (MPA) there are two MSAs or Primary MSAs (PMSAs). Both MSA's within the North Central Coast MPA require PM2.5 Monitoring. The Salinas MSA is required to sample on a 1 in 3 day schedule and is also required to have a collocated sampler. The Santa Cruz / Watsonville MSA is required to sample on a 1 in 3 day schedule. Both sampling sites one for each MSA within the planning area are scheduled to be core sites.

In addition to the required core sites in MSAs two additional sites are required in class 1 areas Within the planning area. One at the Pinnacles NM and one at Ventana Wilderness area.

Table 1.5.1 identifies the number of core PM2.5 monitoring sites to be operated within the North Central Coast Monitoring Planning Area.

Table 1.5.1 Required and Proposed Core PM2.5 Monitoring Sites

MSA/PMSA/County	Population in 1995	Required Core PM2.5 Monitoring Sites		Planned PM2.5 Sites
		Everyday Sampling	1 in 3 day Sampling	
Salinas, MSA	355,660	0	1+1	0
Santa Cruz / Watsonville, MSA	229,734	0	1	0
Total		0	3	0

Salinas, MSA is scheduled to have a collocated sampler.

2.0 PM2.5 MONITORING NETWORK ELEMENTS

Several types of PM2.5 monitors will be part of the PM2.5 monitoring network. This section summarizes the two PM2.5 monitors under discussion:

- 1) monitors planned for deployment in 1998 and 1999; and
- 2) currently operating particulate matter monitors at PM2.5 sites.

For a summary of particulate matter monitoring outside of the PM2.5 monitoring network, please refer to the statewide summary in Section ____.

2.1 PM2.5 Monitors Planned for Deployment

The planned PM2.5 monitoring network will collect data for multiple objectives, including:

- (1) comparing sampling results with the PM2.5 National Ambient Air Quality Standards to determine attainment/nonattainment status;
- (2) developing and tracking of implementation plans for the area; and
- (3) assisting health studies and other ambient aerosol research activities.

In order to understand the nature of the PM2.5 problem in the North Central Coast Air Basin and to develop control strategies, multiple monitor types will be needed. The Federal Reference Method (FRM) sampler is a gravimetric filter-based sampler that produces a concentration measurement of PM2.5 over a 24-hour period. The FRM alone cannot support multiple information needs of the PM2.5 network. The sampler design includes a Teflon filter that can experience a loss of volatile constituents, which can be captured and retained better by other sampling techniques. In addition, it does not provide temporally resolved data or full chemical characterization of ambient aerosols.

In addition to FRM monitors, one other type of instrument is required for deployment as part of the PM2.5 network: speciation sampler. Speciation samplers provide a full chemical characterization of ambient aerosols for developing emission mitigation strategies and for tracking the success of implemented control programs.

The North Central Coast MPA PM2.5 monitoring network will consist of 2 monitoring sites. Both of these sites will be deployed in 1998. Each of the two sites will operate FRM samplers purchased through the National Contract established by the U.S. EPA. One of these monitoring sites in the MPA will operate collocated samplers for QA/QC evaluation.

PM2.5 speciation samplers are proposed for one site in 1999. Table 2.1.1 lists the monitoring site and the type of instruments planned at this site.

Table 2.1.1 PM2.5 Monitoring Network

Site Location	AIRS Site ID	PM2.5 FRM	PM2.5 Speciation	PM2.5 TEOM/BAM	Other PM2.5 Monitor
Salinas (new Site)	060531003	XX	Y		
Santa Cruz Soquel Ave.	060870007	X			

Codes:

- X Monitor to be deployed in 1998
- Y Monitor to be deployed in 1999
- XX Collocated particulate monitors used for precision data to be deployed in 1998
- YY Collocated particulate monitors used for precision data to be deployed in 1999
- * Existing sampler (not an equivalent sampling method)

2.2 Existing Particulate Matter Monitors

The existing particulate matter network in the North Central Coast MPA consists of 7 monitoring sites. The monitoring instruments operating at these sites include:

- ▶ 7 High Volume Size Selective Inlet samplers (SSIs) collecting 24-hour average PM10 samples;

Both of the proposed PM2.5 sites will be located at the existing PM10 sites. Table 2.2.1 summarizes the particulate matter monitoring resources available at the proposed PM2.5 monitoring sites. The complete summary of particulate matter monitoring resources in the North Central Coast Air Basin can be found in Table____ in the statewide summary.

The particulate matter data obtained from these sites are used to meet the following objectives:

- ▶ Compare measured concentrations to the State and federal PM10 standards;
- ▶ Track changes in the particulate matter concentrations over time;
- ▶ Evaluate the population exposure;
- ▶ Assess the impact from transported particulate matter;
- ▶ Assist in health studies and other research; and
- ▶ Manage the agricultural burning program in the Valley.

2.3 PM2.5 Quality Assurance

The agencies operating PM2.5 monitors in the North Central Coast MPA will adopt a schedule for implementing quality assurance procedures developed by the ARB. Please refer to the section ____ in the statewide summary for more information about the schedule.

2.4 Laboratory Analyses

The FRM instruments collect PM_{2.5} over 24-hour periods on Teflon-membrane filters from air drawn at a controlled flow rate through a tested PM_{2.5} inlet. Within 96 hours after the sample collection period, the filter contained in the filter cassette is removed from the sampler and placed in a protective container. During the period between filter retrieval from the sampler and the start of conditioning, the filter will be maintained at a temperature below 25 degrees centigrade. The filters are to be transported within 24-hours to the ARB Monitoring and Laboratory Division in Sacramento or other assigned laboratory. The filters containing PM_{2.5} samples will be “conditioned” and weighed at the laboratory.

Samples collected from the speciation monitors will be analyzed by a network of 1 to 3 laboratories to be established within the U.S. throughout the country. These laboratories will be working under contract performing the necessary laboratory analyses. The establishment of this network of laboratories is still under development with the specific laboratories yet to be determined.

Table 2.2.1 Existing Particulate Matter Monitors at Proposed PM_{2.5} Sites

Site Location	AIRS Site ID	Dichot	PM10 SSI	PM10 TEOM/BAM	Other PM Monitors
Salinas (new site)	060531003		X		
Santa Cruz Soquel Ave.	060870007		X		

Codes:

X	Existing monitor
COH	AISI Tape Sampler for soiling index (coefficient of haze)
Neph	Light Scatter (nephelometer)
SSI	High volume Size Selective Inlet Sampler collecting 24-hour average PM10 samples
Dichot	Dichotomous sampler collecting 24-hour average fine fraction and coarse fraction samples
TEOM	Tapered Element Oscillating Microbalance collecting PM10 measurements hourly
BAM	Beta Attenuation Monitor collecting PM10 measurements hourly

3.0 PM2.5 MONITORING SITES TO BE DEPLOYED IN 1998

During 1998, two PM2.5 monitoring sites are planned for deployment in the North Central Coast MPA. This section discusses the criteria used in the selection of the two PM2.5 monitoring sites along with the important parameters that characterize each site.

3.1 Monitor Siting

The North Central Coast MPA has fairly uniform topography and climate. The existing particulate matter network in the North Central Coast MPA consists of 7 sites. During the PM2.5 site selection process the following factors were evaluated:

- ▶ Population statistics and distribution;
- ▶ Land use characteristics;
- ▶ Local climate;
- ▶ Suspected area emission sources (wood smoke, agricultural burning, etc.);
- ▶ Existing particulate matter monitoring network;
- ▶ Existing particulate matter data, including data collected at dichotomous network, PM10 network, and special studies;
- ▶ Potential transport corridors; and
- ▶ Ongoing special health studies.

After the review process it was determined that the existing PM10 sites would be well suited as locations for monitoring PM2.5. All sites selected to operate PM2.5 samplers are located in populated areas where high PM2.5 concentrations are expected. These sites should provide useful information about PM2.5 transport, emission sources, and population exposure.

3.2 Site Description

The network for the North Central Coast MPA, as proposed, includes 2 sites that will be deployed in 1998. The following characteristics apply to all of the proposed sites:

- ▶ Uses a Federal Reference Monitor (FRM) type sampler purchased through the National Contract established by the U.S. EPA;
- ▶ Sited in a population-oriented location;
- ▶ "Site Type" is Core SLAMS ;
- ▶ Represent neighborhood spatial scale;
- ▶ Provide data that will be compared to both the annual standard and the 24-hour standard.

Based on these criteria the following sites listed in Table 3.2.1 are identified for use for PM2.5 monitoring within the North Central Coast MPA.

Table 3.2.1 PM2.5 Monitoring Sites to be Deployed in 1998

Site Location	AIRS Site ID	Operating Agency	Spatial Scale	Monitoring Objective	Site Type	Measurement Method
Salinas (new Site)	060531003	MBU	Neighborhood	M	C	FRM/SQ
Santa Cruz Soquel Ave.	060870007	MBU	Neighborhood	R	C	FRM/SQ

The following codes are used in this table:

Operating Agency:

MBU Monterey Bay Unified APCD

Monitoring Objectives:

R Represent high concentrations in a populated area.
M Determine the highest concentration expected to occur in the area covered by the network (more than one site per area may be needed).
T Determine the extent of regional pollutant transport.
HS To support special health studies.
P Monitoring at PAMS areas

Site Type:

C Core SLAMS
S non-core SLAMS
P Special Purpose Monitors

Measurement Method:

FRM/SCH Federal Reference Method Single Channel Sampler
FRM/SQ Federal Reference Method Sequential Sampler

The monitoring objectives at each of the monitoring sites in the North Central Coast MPA will be further evaluated during the next year's annual network plan when PM2.5 data will be available from these sites.

4.0 PM2.5 MONITORING SITES TO BE DEPLOYED IN 1999

There are plans to deploy one PM2.5 chemical speciation monitor within the North Central Coast MPA in 1999 at the Salinas site.

4.1 Monitoring Sites Operating PM2.5 FRM Monitors

There are no plans to deploy any additional PM2.5 FRM within the North Central Coast MPA.1999.

Table 4.1.1 PM2.5 Monitoring Sites to be deployed in 1999

Site Location	AIRS Site ID	Operating Agency	Spatial Scale	Monitoring Objective	Site Type	Measurement Method
None Planned						

4.2 PM2.5 Chemical Speciation Sampling

The basic objective of the PM2.5 chemical speciation sampling and analysis program is to develop seasonal and annual chemical characterization and distribution, across the country, of the ambient aerosols present in PM2.5 samples. These chemically resolved data will be used to perform source attribution analyses, evaluate emission inventories and air quality models, and support health related research studies.

The EPA recognizes that sampling for chemical speciation is a developing science, and encourages creative approaches to chemical speciation sampling. The ARB and the local air quality districts will evaluate existing chemical speciation samplers and select the best-suited instruments for the monitoring conditions in the North Central Coast MPA. The selected instrument will collect samples for the currently targeted chemical analytes, and include the following:

- ▶ Cations: particulate ammonium, ionic sodium, calcium, and magnesium;
- ▶ Anions: particulate sulfate, particulate nitrate, particulate chloride;
- ▶ Carbon: total, organic, and elemental;
- ▶ Trace elements: sodium, magnesium, etc., through lead; and
- ▶ Semi-volatile organic particles.

The sites listed in Table 4.2.1 below were selected for collecting chemically speciated data because they best meet the following list of criteria in the order of importance:

- ▶ High PM2.5 concentrations, or expected significant contribution of PM2.5 to high PM10 concentrations;
- ▶ Located in a area of significant population density;
- ▶ Supports the agricultural burning program in the valley;
- ▶ Located in PAMS areas where there is a maximum precursor site for PM2.5 (this may also be a high concentration site);
- ▶ Significant for atmospheric transport determinations;
- ▶ Geographical representation of an monitored area.

Table 4.2.1 PM2.5 Chemical Speciation Monitoring

PM2.5 Chemical Speciation Site	AIRS Site ID	Operating Agency	Monitoring Method
Salinas (new Site)	060531003	MBU	to be determined

MBU Monterey Bay Unified APCD

4.4 Continuous PM2.5 Monitoring

There are no plans to deploy any continuous monitors within the North Central Coast MPA in 1998 or 1999.

5.0 SAMPLING FREQUENCY

The U.S. EPA requirements call for everyday sampling of PM_{2.5} at certain core SLAMS sites and one in three day sampling at all other PM_{2.5} and all PM₁₀ sites. In order to collect sufficient data and at the same time conserve monitoring resources, the ARB and the local air quality districts are proposing alternative sampling frequencies for PM_{2.5} and PM₁₀.

5.1 PM_{2.5} FRM Sampling Frequency

Sampling will be performed on a 1 in 3 day sampling schedule at both sites in the North Central Coast MPA as specified in the regulations.

Table 5.1.1 PM_{2.5} FRM Sampling Frequency

Site Location	AIRS Site ID	Operating Agency	Sampling Frequency	
			Required	Proposed
Salinas (New Site)	060531003	MBU	1 in 3 day	1 in 3 day
Santa Cruz Soquel Ave.	060870007	MBU	1 in 3 day	1 in 3 day

MBU Monterey Bay Unified APCD

5.2 PM_{2.5} Chemical Speciation Sampling Frequency

The federally required sampling frequency for PM_{2.5} chemical speciation is once in 12 days. The District if required to sample for PM_{2.5} with chemical speciation will use the 1 in 12 day schedule as required by the regulations.

5.3 PM₁₀ Sampling Frequency

The new U.S. EPA minimum requirement for PM₁₀ sampling frequency is once every three days. The Air Resources Board and the local air pollution control districts in California are requesting that the U.S. EPA Region 9 grant a statewide waiver allowing sampling at the current schedule of 1 in 6 days, with certain exceptions to be determined on a case by case basis.

[To Reviewers:

There is a need to determine if any of the monitoring sites in a given jurisdiction need to be sampling on a more frequent basis. This should be done by the local air pollution

control agencies. If a district is planning to sample more frequently because of sites with 24-hour concentrations that are near the 24-hour standard level, these site locations should be listed below along with a proposed PM10 sampling frequency. For those areas in which the annual standard is the controlling standard, the minimum sampling schedule for all monitors in the area will be 1 in 6 day.]